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EXAMINER

LEO, LEONARD R

ART UNIT PAPER NUMBER

3743

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14

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Paper No. 14

Application Number: 10/002,633  
Filing Date: December 05, 2001  
Appellant(s): HOCKER ET AL.

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Elaine P. Spector  
For Appellants

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**MAILED**  
**OCT - 1 2003**  
**GROUP 3700**

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed September 3, 2003.

**(1) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(2) *Related Appeals and Interferences***

A statement identifying there are no related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(3) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

**(4) *Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) *Summary of Invention***

The summary of invention contained in the brief is correct.

**(6) *Issues***

The appellant's statement of the issues in the brief is correct.

**(7) *Grouping of Claims***

The rejection of claims 1-2 and 5-6 stand or fall together because appellant's brief includes a statement that this grouping of claims stands or falls together and reasons in support thereof. See 37 CFR 1.192(c)(7).

**(8) *Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

Art Unit: 3743

**(9) Prior Art of Record**

849,255	CERMAK (GB)	9-1960
5,365,400	ASHIWAKE ET AL.	11-1994
5,586,866	WETTSTEIN	12-1996

Livingood, J.N.B. et al. "Heat-Transfer Characteristics of a Single Circular Air Jet Impinging on a Concave Hemispherical Shell" NASA Publication TM X-2859 (August 1973).

**(10) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 5-6 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Cermak.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cermak in view of Ashiwake et al.

Cermak (Figures 2-3) discloses an impingement flow device comprising a plane carrier having a plurality of impingement tubes 5; wall part 8 having a plurality of troughs 7 in one to one correspondence with the tubes and having a rotationally symmetric form; but does not disclose the troughs having a spherical cup form.

Ashiwake et al discloses a heat exchanger comprising a plurality of impingement orifices in carrier 16; and wall parts 8 having a remote planar side and spherical cup impingement side (Figure 8) for the purpose of improving heat transfer.

Since Cermak and Ashiwake et al are both from the same field of endeavor and/or analogous art, i.e. impingement cooling, the purpose disclosed by Ashiwake et al would have been recognized in the pertinent art of Cermak.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Cermak troughs having a spherical cup form for the purpose of improving heat transfer as recognized by Ashiwake et al.

Claims 1-2 and 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Livingood et al in view of Wettstein (US).

Livingood et al discloses cooling a turbine vane or blade by impingement to a concave hemispherical surface, but does not disclose a plurality of impingement jets opposed to a wall part.

Art Unit: 3743

Wettstein discloses a turbine blade (Figure 6) comprising a wall part 10 having an impingement facing side and opposed planar side, and carrier 13 having a plurality of impingement orifices defined by tubes 11 for the purpose of achieving a desired heat exchange.

Since Livingood et al and Wettstein are both from the same field of endeavor and/or analogous art, the purpose disclosed by Wettstein would have been recognized in the pertinent art of Livingood et al.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Livingood et al a plurality of impingement orifices defined by tubes for the purpose of achieving a desired heat exchange as recognized by Wettstein. Further, the modification is deemed to be nothing more than a mere duplication of parts, where it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *In re Harza*, 274F.2d 669, 124 USPQ 378 (CCPA 1960).

**(11) Response to Argument**

Regarding appellants' remarks with respect to the anticipatory rejection in view of Cermak, the troughs 7 (Figures 2-3) are read as "similar rotationally symmetrical forms." Claim 1 recites "spherical cups *or* similar rotationally symmetric forms." Although, the troughs of Cermak are to be avoided as disclosed by applicants, the claim recitation of "similar rotationally symmetrical forms" reads on the structure of Cermak having a "rotationally symmetric form."

Regarding appellants' remarks with respect to the obviousness rejection in view of Cermak and Ashiwake et al, the claimed invention merely recites an "impingement flow device." In response to appellants' argument that Ashiwake et al is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be

Art Unit: 3743

reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both Cermak and Ashiwake et al are concerned with impingement cooling of a “wall part” via an orificed carrier. The person having ordinary skill in the art is versed in thermodynamics, fluid mechanics, among other typical college engineering fundamentals. The environments of Cermak and Ashiwake et al may be different. However, they share the same simple fundamental theory of impingement cooling, wherein a single impingement jet is opposed to a single trough to convectively cool the heat generating surface, i.e. thermodynamics. Cermak (Figures 2-3) discloses impingement jets 5 opposed to troughs 7 in wall part 8 for convectively cooling the wall part. Similarly, as disclosed in Figure 8 of Ashiwake et al, the impingement jet directs fluid onto a spherical cup in wall part 8 to convectively cooling the wall part 8. Both disclosures are pertinent to the claimed invention and seek to solve a common problem with a common structure, i.e. impingement jet cooling.

Regarding appellants’ remarks with respect to the obviousness rejection in view of Livingood et al and Wettstein, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Initially, Livingood et al is a technical paper studying the theory of impingement cooling on a hemispherical surface. Typically, in engineering, analyses are based on point-wise or finite elements. To simplify analysis, many variables are held to be constant, and based on the simplest or basic equations. The analysis is theorized and applied to real world conditions. Livingood et al is no different, and is the norm in this impingement cooling study.

Art Unit: 3743

The hemispherical cup in Livingood et al is of constant thickness for ease of measurement and calculation.

Livingood et al (bottom of page 1) discloses “An effective method of cooling the leading-edge region of turbine vanes and blades is by impingement of cool air on the internal surface.”

The person having ordinary skill in the art being versed as noted above with Cermak and Ashiwake et al, recognizes a single impingement jet with a single hemispherical internal surface alone does not properly cool the internal surface of a turbine vane or blade. Rather, the skilled artisan would apply the finite element analysis of Livingood et al and apply it in the real world, such as in Wettstein, which discloses a plurality of impingement cooling jets opposed to the internal surface turbine vane or blade to be cooled.

In response to appellants’ remarks with respect to the combination of Livingood et al and Wettstein, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this respect, applicants believe the combination of Livingood et al and Wettstein would destroy the disclosure of Wettstein, in that, Wettstein discloses the air jets are opposed to humps as in Figure 3. This reasoning is flawed, because the primary reference of Livingood et al would be destroyed, where one air jet is opposed to only one hemispherical cup.

The secondary reference of Wettstein discloses impingement cooling a turbine blade and teaches one of ordinary skill in the art to employ a plurality of impingement jets opposed to a



Art Unit: 3743

wall in a turbine blade for the purpose of achieving a desired heat exchange. Clearly, Livingood et al and Wettstein are both related to jet impingement cooling of the internal surface of turbine vanes or blades. Wettstein merely reinforces the case law of *In re Harza*, which applicants do not dispute. Appellants have failed to recognize the level of skill in the art of turbine vane or blade cooling and appear to downplay this ordinary skill. One of ordinary skill in the art of turbine vane or blade cooling would employ plural impingement jets opposed to corresponding spherical concavities to achieve a desired heat exchange. Furthermore, in Wettstein (Figure 6, similar to appellants' Figure 7), one of ordinary skill in the art is not merely interested in cooling the leading edge, rather any or all surfaces that encounter the high temperature combustion gases.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

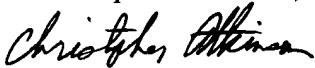


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Primary Examiner  
Art Unit 3743

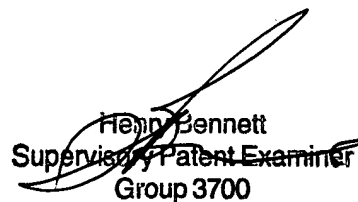
September 29, 2003

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